

WHAT IS CLAIMED IS:

1. A vehicle crash simulator comprising:
a simulation platform;
a motion generator including a plurality of
5 actuators translationally fixed to the
simulation platform; and
a motion controller configured to operate the
plurality of actuators to impart a
simulated crash motion or force to the
10 simulation platform.
2. The vehicle crash simulator of claim 1 and
further comprising the velocity generator coupled to
the motion controller and configured to operate the
15 velocity generator to impart a crash acceleration to
the simulation platform.
3. The vehicle crash simulator of claim 2 wherein
the simulation platform is on-board a base sled and
20 the velocity generator is coupled to the base sled to
accelerate or move the base sled to impart the crash
acceleration to the simulation platform.
4. The vehicle crash simulator of claim 3 wherein
25 the plurality of actuators are on-board the base sled
and movable therewith along an acceleration stroke.

5. The vehicle crash simulator of claim 3 wherein the base sled is movable along a track formed of opposed spaced rails.

5 6. The vehicle crash simulator of claim 1 wherein the plurality of actuators are coupled to the simulation platform and configured to impart force and motion F_z along a z-axis of the simulation platform and one of force and motion F_y or force and
10 motion F_x along x or y axes of the platform.

7. The vehicle crash simulator of claim 1 wherein the plurality of actuators are coupled to the simulation platform to impart a resultant force F_r or
15 motion having multi-axis force components.

8. The vehicle crash simulator of claim 1 the plurality of actuators are coupled to opposed ends of the simulation platform and operable by the motion
20 controller to impart a simulated crash acceleration.

9. The vehicle crash simulator of claim 1 including a plurality of actuators coupled to opposed sides of the simulation platform to simulate a force F_y along
25 the y-axis and a plurality of actuators coupled to the simulation platform to simulate force F_z along the z-axis.

10. A vehicle crash simulator comprising:
a simulation platform;
a motion generator including a plurality of
actuators operably coupled to the
5 simulation platform to impart a plurality
of multi-axial forces F_z along a z-axis, F_x
along an x-axis or F_y along a y-axis to the
simulation platform; and
a motion controller configured to operate the
10 plurality of actuators to impart the
plurality of multi-axial forces.
11. The vehicle crash simulator of claim 10 wherein
the plurality of actuators are on-board a base sled and
15 movable therewith along a track to simulate crash
accelerations.
12. The vehicle crash simulator of claim 11 wherein
the plurality of actuators are inclined between the
20 base sled and the platform to impart a resultant Force
 F_r including a F_z force component and a force F_x or
force F_y component.
13. The vehicle crash simulator of claim 10 wherein
25 the plurality of actuators are operable to impart force
 F_z , force F_y and force F_x relative to x, y and z axes.

14. The vehicle crash simulator of claim 11 wherein the simulator includes a velocity generator to impart a crash acceleration pulse to the base sled.
- 5 15. The vehicle crash simulator of claim 11 wherein the simulation platform is coupled to the base sled via the plurality of actuators.
- 10 16. The vehicle crash simulator of claim 10 wherein the plurality of actuators impart force F_x along the x-axis to simulate crash accelerations and force F_z and force F_y to simulate crash motions.
- 15 17. A vehicle crash simulator comprising:
a simulation platform;
a simulator configured to impart acceleration or force to the simulation platform to simulate crash accelerations or motions;
and
20 a video imaging system including a video camera to capture an image of a simulated crash event to control operation of the simulator.
- 25 18. The crash simulator of claim 17 wherein the video imaging system includes an image processor to provide acceleration or motion feedback to the simulator.

19. A method for simulating a vehicle crash comprising the steps of:

5 simulating a crash acceleration pulse by
 accelerating a base sled having a
 platform carried on board the base
 sled; and

 simulating crash forces or motions through
 a plurality of actuators on board the
 base sled.

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20. The method of claim 19 wherein the crash acceleration and the crash forces or motions are simulated based upon feedback from a video imaging system to control the plurality of actuators.

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21. The method of claim 19 wherein the step of simulating the crash forces or motions simulates motion relative to six degrees of freedom.

20 22. A method for simulating a vehicle crash comprising the steps of:

 controlling a plurality of actuators
 connected to a simulation platform to
 impart force to the simulation
25 platform along multiple x, y or z axes
 to simulate crash acceleration or
 motions.

23. The method of claim 22 wherein the step of simulating crash acceleration or motions comprises:

5 actuating the plurality of actuators to
 impart multiple forces, force F_z , force
 F_x or force F_y to the simulation
 platform.

24. The method of claim 22 wherein the step of
simulating crash forces or motions simulates pitch, yaw
10 and roll motion of a vehicle crash.

25. The method of claim 22 and further comprising the
step of:

15 accelerating a base sled carrying the
 simulation platform to simulate crash
 acceleration.

26. The method of claim 22 wherein the step of
controlling the plurality of actuators provides a force
20 F_x to simulate a crash acceleration.